THE OSPREY

7440 159TH PL NE
REDMOND, WA 98052

ENVIRONMENTAL NOISE STUDY

Submitted to:
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A3 ACOUSTICS

1. INTRODUCTION

This report presents the results of the environmental noise study for The Osprey apartments to be constructed at 7440 159th PL NE in Redmond, WA 98052. The goal of this analysis is to ensure that environmental noise in the future residences is mitigated to within industry-standard limits.

2. SITE DESCRIPTION

The project site is located on the northeast corner of 159th Pl NE and Leary Way NE in Redmond Washington. In relation to the site, Leary Way NE is located on the southeast and 159th Pl NE is located on the southwest. There are apartment buildings on the north and wooded area on the east. Noise sources of concern is traffic from all surrounding roads but particularly Leary Way NE.

Section 6.36.060 in the Redmond Municipal Code states:

> *A. This section applies to all residential short plats, subdivisions, and multi-family projects (five or more units) proposed after December 24, 1998.*
>
> *B. For all residential short plats, subdivisions, and multi-family projects proposed within 100 feet of an arterial or state highway that has an existing or projected traffic volume of 20,000 or more average daily trips, the applicant shall include sound attenuation measures in the site design and/or the design and construction plans of the structure(s).*
>
> *C. The applicant shall demonstrate that proposed measures provide sound attenuation and that the methods go beyond standard building construction practices. Measures that reduce noise at the site, such as building location, design, berms, noise attenuating fences, and barriers, to help mitigate outside noise exposure shall be used whenever practical in preference to measures which only protect interior spaces. Noise walls over eight feet in height shall be avoided unless all other mitigation measures are determined infeasible and impractical. Blank walls shall be prohibited. The Technical Committee shall approve appropriate methods for reducing noise levels. (Ord. 2590 § 2 (part), 2011).*

Leary Way NE exceeds the 20,000 ADT criterion stated above. This street is on the SE corner and is approximately 50 ft from the proposed building. The traffic volumes are approximately 24,000 as of 2014.

3. DESIGN CRITERIA

It is our recommendation that interior noise levels attributable to traffic noise shall not exceed Ldn 45 dBA, which is the standard used by HUD, State of California Noise Standard, and FAA.

Ldn is similar to a 24-hour Leq with the addition of a 10 dBA penalty on the hourly Leq measured during the nighttime hours of 10 p.m. to 7 a.m. The Leq is the dBA level representative of a time-constant source that contains the equivalent amount of sound energy as a time-variable source over a given time period.

4. NOISE MEASUREMENTS

Noise monitoring was conducted on site for 24 hours from 8/28/19 to 8/29/19 to determine the levels from Leary Way NE and other surrounding roads and noise sources. Additional short-term (15-minute) measurements were taken during the hour of 12:00PM on 8/28/19. The measurements were taken using a Svantek 971 Type I (in accordance with ANSI S1.4) sound level meter and analyzer. The measurement locations are marked in Figure 1. Note that the long-term noise measurement location was set on the NW corner of Leary Way and 159th Pl rather than the corner of the site as the current building is an auto shop and produces noise that would otherwise be absent.

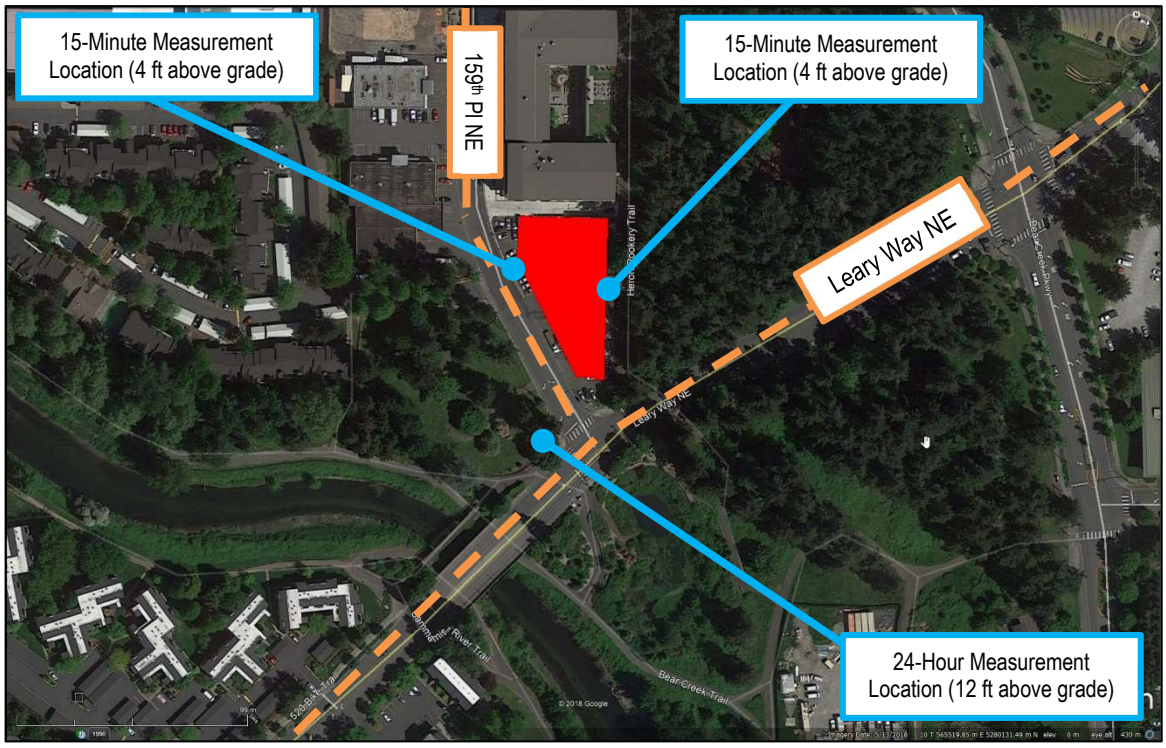


Figure 1: Measurement locations and site vicinity. Proposed building envelope shown in red.

5. Measurement Results

Figure 2 shows the measured hourly Leq and the Ldn over the 24-hour period from 8/28/19 to 8/29/19 at the location shown in Figure 1 above. Table 1 describes the adjusted Ldn of the short-term measurements. To calculate the adjusted Ldn, the difference between the 15-minute and hourly Leq of the same hour was applied to the long-term measurement Ldn.

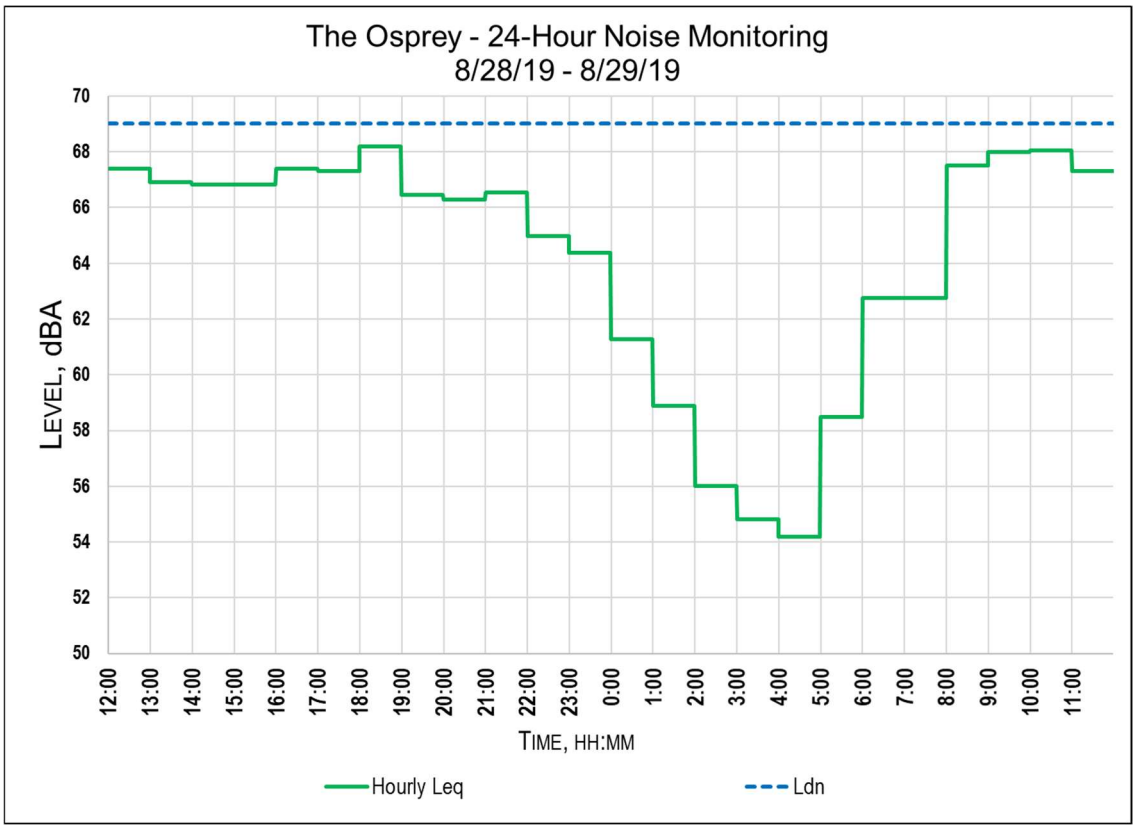


Figure 2: 24-Hour Measurement Results

Measurement Location	Adjusted Ldn, dBA
South Facade	69
East Facade	57
West Facade	59

Table 1: Adjusted Ldn at short-term measurement locations on existing site. Adjusted Ldn is calculated as the difference between the long-term measurement hourly Leq and the short-term measurement Leq of the same hour applied to the Ldn of the long-term measurement.

6. Calculations

Noise emissions on site are modeled using CadnaA V2018. Predicted noise emissions on the site are a function of overall traffic count, heavy vehicle percentage, speed limit, road type and road gradient. Additionally, the model is calibrated and verified with the noise measurements taken at the site. Based on the calibrated model, the noise propagation is mapped on the proposed site and building facade in a three-dimensional receiver grid. These values determine the recommended minimum performance of exterior construction required to meet the interior design goals.

7. Environmental Noise Model

Figure 3 shows a 2D representation of the environmental noise model. Noise levels from the traffic noise sources are shown in 5 dB contours at a 4-meter/15-foot height. Numbers displayed in the octagonal symbols on the building envelope represent the maximum predicted L_{DN} at each respective vertical receiver line.

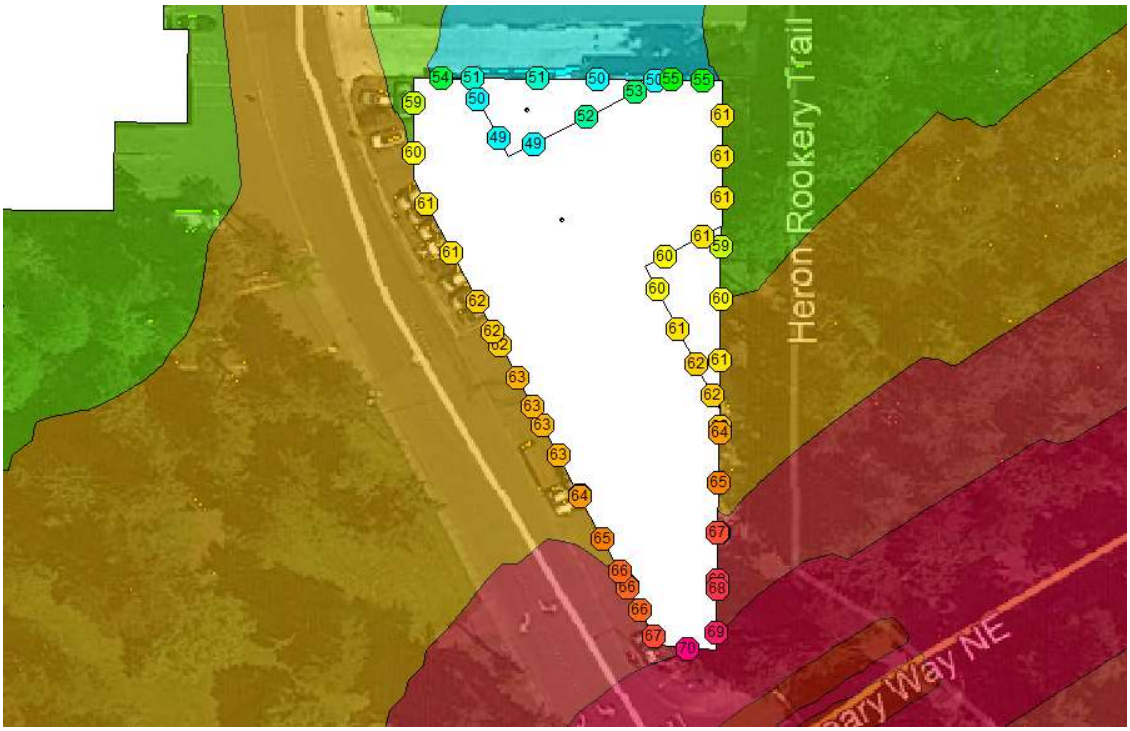


Figure 3 – The Osprey Environmental Noise Model

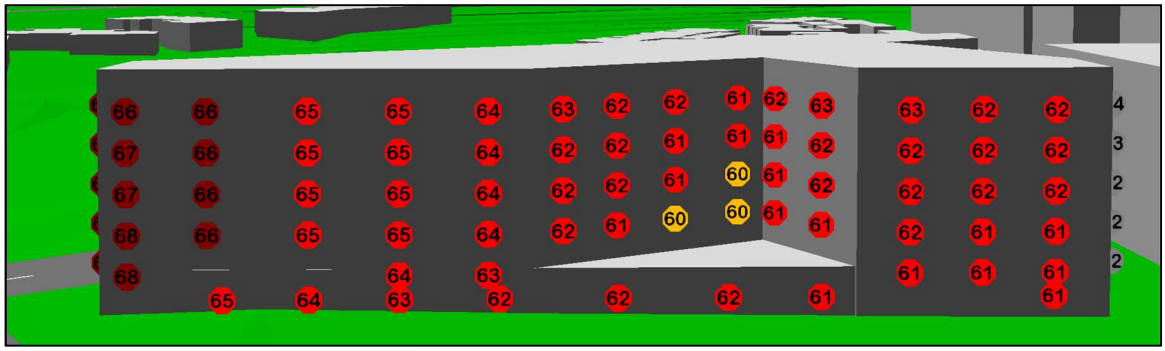


Figure 4: CadnaA environmental noise model – Predicted Ldn, dBA (east side)

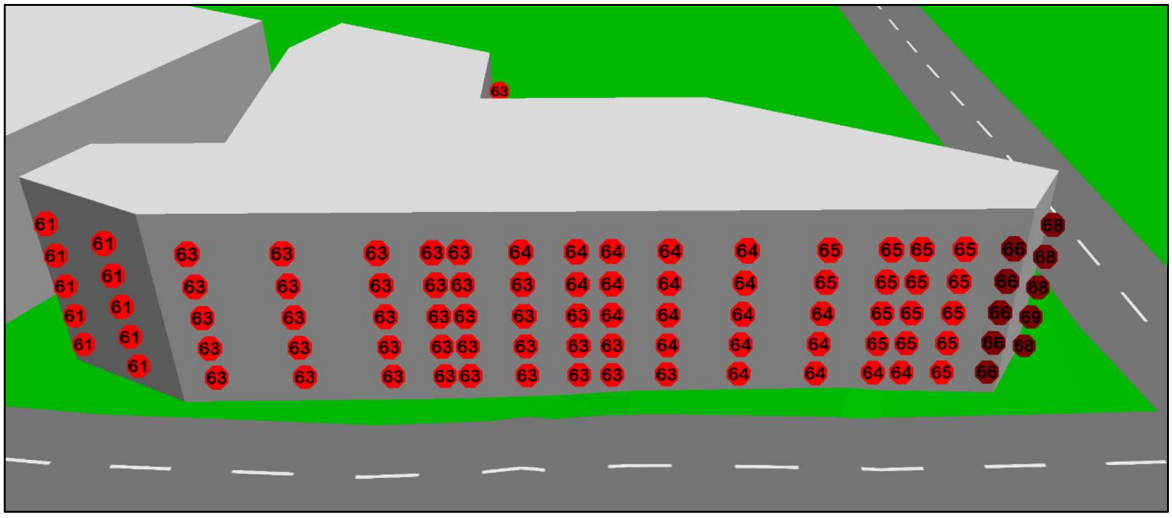


Figure 5: CadnaA environmental noise model – Predicted Ldn, dBA (west side)

8. Noise Mitigation

8.1 Exterior Wall

A standard exterior wall (described below) will provide adequate sound attenuation to meet Ldn targets.

- 1 layer of 5/8" gypsum board on the unit side
- 2"x6" wood stud
- R-21 batt insulation
- Exterior gypsum sheathing
- Rain Screen
- Siding

Careful attention should be given to sound leaks. Sound leaks can reduce the performance of a wall by more than 10 STC points if not treated. Implementing the following recommendations will reduce sound transmission due to sound leaks.

- Acoustic construction details are essential to the performance of any wall assembly. See ASTM C919: Standard Practice for Use of Sealants in Acoustical Applications. At the concrete slab, it is recommended that the layer of gypsum board on the unit side be sealed on top and bottom with resilient caulk, as well as around the junction boxes.

- Window rough-in seams should be no greater than 1/4", and all seams should be caulked with resilient caulking.

- Seal, caulk, gasket, or weather strip all joints and seams to eliminate air leakage through these assemblies. This would include around windows and doorframes, at penetrations though walls, and all other openings in the building envelope.

8.2 Windows

Sound rated window assemblies (STC 33/OITC 26 and STC 35/OITC 28) are recommended in the locations outlined below to meet Ldn 45 in residential areas. An STC 33 window is usually achieved using 1/4" glass –1/2" air space – 1/8" glass. An STC 35 window is usually achieved using 1/4" glass – 1/2" air space – 3/16"glass

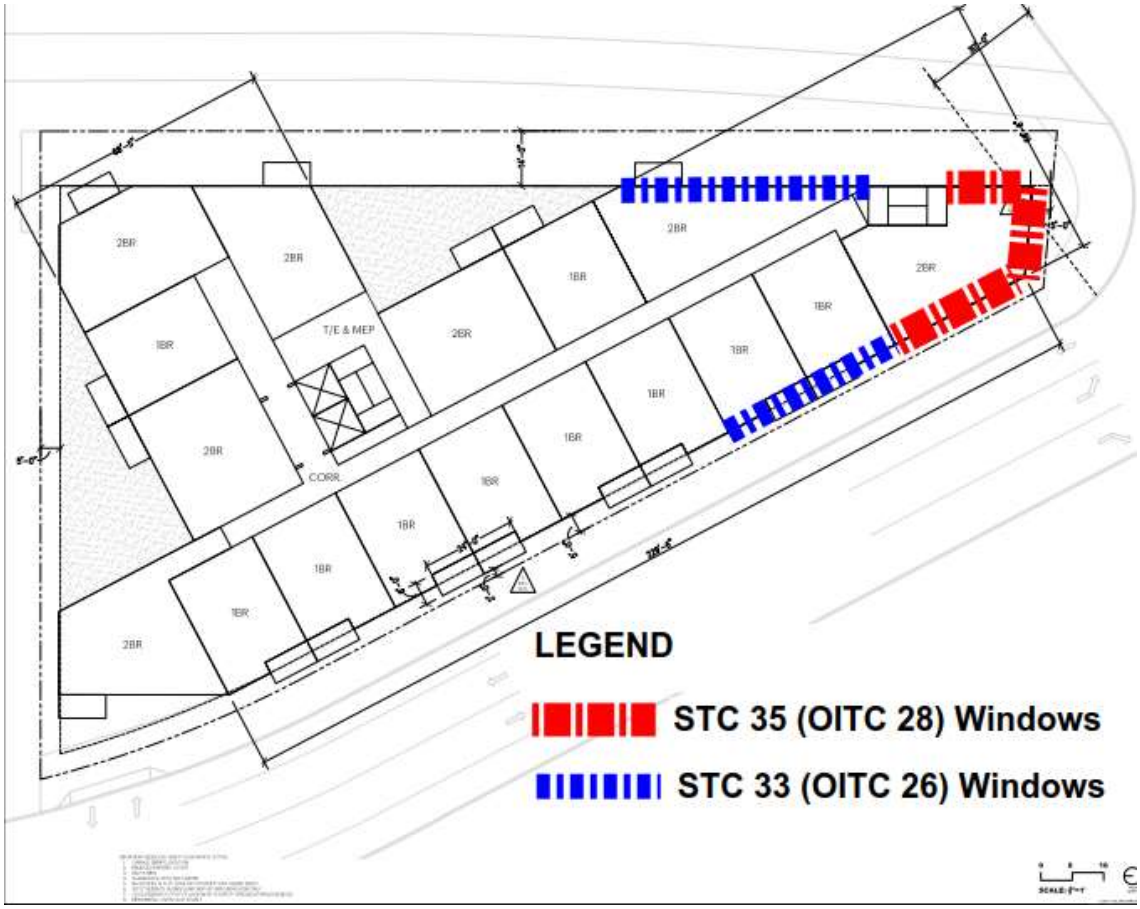


Figure 8: STC Rated Window Recommended Locations

Notes:

- Windows are required to have a fixed sash or efficiently weather stripped, operable sash. The sash shall be rigid and weather stripped with material that is compressed airtight when the window is closed, so as to conform to an infiltration rate not to exceed 0.5 cubic foot per minute per foot of crack length in accordance with ASTM E-283-65-T.

- Glass shall be sealed in an airtight manner with a non-hardening sealant or soft elastomeric gasket or gasket tape.

- The perimeter of window and door frames shall be sealed airtight to the exterior wall construction with a sealant conforming to one of the following Federal specifications: TT-S-00227, TT-S-00230, or TT-S-00153.

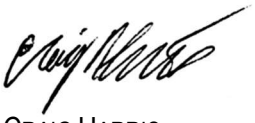
- Trickle vents if applicable that maintain the acoustical performance of the window should be used.

9. Summary

Measurement and analysis of existing environmental noise conditions indicate that the recommendations outlined in section 7 are necessary to meet the an interior Ldn of 45 dBA in the residential units.

Please don't hesitate to reach out if you have any questions.

Sincerely,
A3 Acoustics, LLP



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